LAB # 6

IMPLEMENTATION OF FOR AND NESTED FOR LOOPS

Loops in Programming Languages

There are many situations where a certain operation is repeated number of time, this repetition is termed "loop" in programming languages.

There are three types of Loops:

1. for Loop
2. while Loop
3. do - while Loop

Nesting may extend these loops.

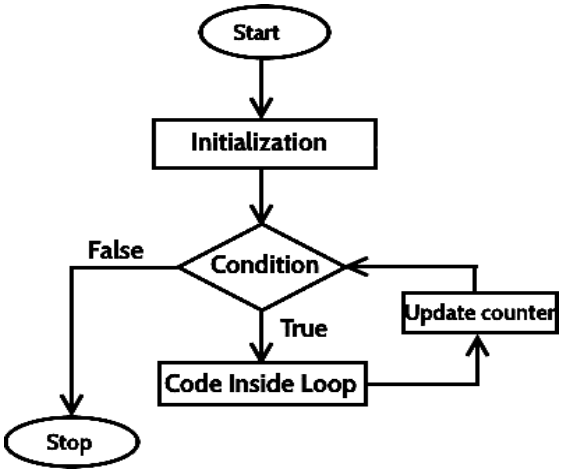
For Loop

There are different loop statements in C++ language and "For" is one of them. These statements also a low one or more statements to be repeated. The "For" loop is considered most flexible loop because it allows number of variations. In its most common form, the "For" loop is used to repeat a statement or a block of statements a specified number of items.

General syntax:

```
for (initialize ;condition ;increment)
{
        Do this;
}
```

Flow diagram



Example

```
#include <iostream>
using namespace std;
int main()
{
        for(int i=1; i<=4; i++)
        {
        /* This statement would be executed
        * repeatedly until the condition
        * i<=6 returns false.
        */
        cout<<"Value of variable i is: "<<i<<endl;
        }
        return 0;
}
```

Output:

```
Value of variable i is: 1
Value of variable i is: 2
Value of variable i is: 3
Value of variable i is: 4
```

C++ NESTED LOOPS

A loop can be nested inside of another loop. C++ allows at least 256 levels of nesting.

Syntax

The syntax for a **nested for loop** statement in C++ is as follows −

```
for ( init; condition; increment )
{
   for ( init; condition; increment )
   {
      statement(s);
   }
   statement(s); // you can put more statements.
}
```

Example

The following program uses a nested for loop to find the prime numbers from 2 to 100 −

```
#include <iostream>
using namespace std;

int main ()
{
        int i, j;

        for(i = 2; i<100; i++)
        {
          for(j = 2; j <= (i/j); j++)
            if(!(i%j)) break; // if factor found, not prime
            if(j > (i/j)) cout << i << " is prime\n";
        }

        return 0;
}
```

This would produce the following result −

```
2 is prime
3 is prime
5 is prime
7 is prime
11 is prime
13 is prime
17 is prime
19 is prime
23 is prime
29 is prime
31 is prime
37 is prime
41 is prime
43 is prime
47 is prime
53 is prime
59 is prime
61 is prime
67 is prime
71 is prime
73 is prime
79 is prime
83 is prime
89 is prime
97 is prime
```

Lab Tasks

1- Write a program to generate a series of first 50 even numbers.

2- Write a program that generates a table of any number.

3- Write a program to calculate the factorial of any number.

4- what will the output of the following code

```
#include <iostream>
using namespace std;
int main()
{
  for(int i=1; i<=50; i++)
  {
    /* This statement would be executed
     * repeatedly until the condition
     * i<=50 returns false.
     */
     cout<<"Value of variable i is: "<<i-i+2*i*i<<endl;
  }
  return 0;
}
```

5- Write a program that prints following as output.

```
1
2 2
3 3 3
4 4 4 4
5 5 5 5 5
:
:
9 9 9 9 9 9 9 9 9
```

6- Use nested for loop to generate the following as output.

1	2	3	4	5
2	4	6	8	10
3	6	9	12	15
4	8	12	16	20
5	10	15	20	25

7- Write a program that prints a conversion table from miles to kilometers or from kilometers to miles. The program must first ask what kind of conversion table the user wants. After having asked this, you need an **if** construct in the program. the program must use for loop to print the conversion table. the program must print at least 15 conversion lines.